

CLAIMS

1. An apparatus for measuring total organic carbon in an aqueous solution, comprising:
  - a) an electrochemical cell comprising:
    - i) a diamond-film electrode;
    - ii) a reference electrode; and
    - iii) a counter electrode; and
  - b) one or more carbon dioxide sensors, including at least one gas-phase sensor.
2. The apparatus of Claim 1 wherein the diamond-film electrode is doped with a conductivity inducing material.
3. The apparatus of Claim 1 wherein the gas-phase sensor is a tunable diode laser spectrometer.
4. The apparatus of Claim 1 further comprising an aqueous-phase carbon dioxide sensor.
5. The apparatus of Claim 4 wherein the aqueous-phase sensor is an ion-selective electrode.
6. The apparatus of Claim 2 wherein the conductivity inducing material is boron.
7. A method for measuring total organic carbon in an aqueous solution, the method comprising:
  - a) providing an electrochemical cell comprising of:
    - i) a diamond-film electrode;
    - ii) a reference electrode; and
    - iii) a counter electrode;
  - b) immersing the electrochemical cell of step a) into the aqueous solution;

- c) applying a positive potential to the diamond-film electrode, the positive potential being sufficient to oxidize organics in the solution, thereby producing water and carbon dioxide;
- d) measuring the amount of carbon dioxide produced in step c) using one or more carbon dioxide sensors, including at least one gas-phase sensor; and
- e) determining the amount of total organic carbon in the solution, the amount of total organic carbon being proportional to the amount of carbon dioxide measured in step d).

8. The method of Claim 5 wherein the gas-phase sensor is a tunable diode laser spectrometer.

9. The method of Claim 5 wherein the diamond-film electrode is doped with a conductivity inducing material.

10. The method of Claim 9 wherein the conductivity inducing material is boron.

11. The method of Claim 5 wherein the positive potential is in the range of about 2-2.5 volts.

12. A method for measuring total organic carbon in an aqueous solution, the method comprising:

- a) providing an electrochemical cell comprising of:
  - i) a diamond-film electrode;
  - ii) a reference electrode; and
  - iii) a counter electrode;
- b) immersing the electrochemical cell of step a) into the aqueous solution;
- c) applying a positive potential to the diamond-film electrode, the positive potential being sufficient to oxidize organics in the solution, thereby producing water and carbon dioxide;
- d) measuring the amount of carbon dioxide produced in step c) using one or more carbon dioxide sensors, including at least one gas-phase sensor, and at least one aqueous-phase sensor; and

- e) determining the amount of total organic carbon in the solution, the amount of total organic carbon being proportional to the amount of carbon dioxide measured in step d).

13. The method of Claim 12 wherein the aqueous-phase sensor is an ion-selective electrode.